IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Appellant(s): Ho-Keung Lee
Case: Lee 2 (LCNT/126171)
Serial No.: 10/779,442 **Group Art Unit**: 2616
Filed: 02/13/2004
Examiner: Pasia, Redentor M
Title: PATH BASED NETWORK MANAGEMENT METHOD AND APPARATUS FOR DATA COMMUNICATION NETWORKS

MAIL STOP APPEAL BRIEF-PATENTS
COMMISSIONER FOR PATENTS
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450

SIR:

APPEAL BRIEF

Appellant submits this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 2616 mailed January 9, 2008 finally rejecting claims 1-22.

In the event that an extension of time is required for this appeal brief to be considered timely, and a request therefor does not otherwise accompany this appeal brief, any necessary extension of time is hereby requested.

Appellant believes the only fee due is the $510 Appeal Brief fee which is being charged to counsel's credit card. In the event Appellant is incorrect, the Commissioner is authorized to charge any other fees to Deposit Account No. 20-0782/**LCNT/126171**.

Table of Contents

Real Party in Interest

The real party in interest is LUCENT TECHNOLOGIES INC.

Related Appeals and Interferences

Appellant asserts that no appeals or interferences are known to Appellant, Appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 1-22 are pending in the application. Claims 1-22 were originally presented in the application. Claims 1, 7-12, 15, and 17 have been amended. The final rejection of claims 1-22 is appealed.

Status of Amendments

All claim amendments have been entered.

Summary of Claimed Subject Matter

Embodiments of the present invention are generally directed to a method and apparatus for analyzing networks. More specifically, one embodiment of the invention provides a method of analyzing network characteristics. In particular, a network element in a communication network is queried for local network information. The local network information may include topology information, connection information, and performance information. The local information is received and analyzed by a path analysis module to map a communication path established in the communication network. Further, based on the local network information, a next network element in the communication path is selected for querying for local network information. The method continues in this manner until each network element of the communication path has been identified and the communication path has been mapped. When the communication path is complete, various types of analysis may be performed using the communication path information, for example, network capacity analysis, network fault analysis, and network performance analysis.

For the convenience of the Board of Patent Appeals and Interferences, Appellant's independent claims 1, 7, 13, and 17 are presented below with citations to various figures and appropriate citations to at least one portion of the specification for elements of the appealed claims.

Claim 1 positively recites (with reference numerals, where applicable, and cites to at least one portion of the specification added):

> 1. (previously presented) A method of analyzing network characteristics comprising the steps of:
>
> querying (302) a network element (141) in a communication network (140) for local network information;
>
> receiving (303) the local network information from the network element (141) in response to querying, the local network information

comprising one or more items selected from the group including topology information, connection information, and performance information;

analyzing (305, 306) the local network information received to map a communication path established in the network;

responsive to the local network information received and the communication path mapped in the analyzing step, selecting (308) a next network element (141) of the communication path for querying; and

if the next network element (141) has been selected, iterating the method from the querying step (302) for the next network element (141).

Support for the elements of claim 1 can be found at least from the following sections of Appellant's specification: page 6, line 9 – page 9, line 9 and page 10, line 18 – page 12, line 13.

Claim 7 positively recites (with reference numerals, where applicable, and cites to at least one portion of the specification added):

7. (previously presented) A computer having a memory for storing a software program that, when executed by a processor, causes the computer to perform a method comprising the steps of:

querying (302) a network element (141) in a communication network (140) for local network information;

receiving (303) the local network information from the network element (141) in response to querying, the local network information comprising one or more items selected from the group including topology information, connection information, and performance information;

analyzing (305, 306) the local network information received to map a communication path established in the network;

responsive to the local network information received and the communication path mapped in the analyzing step, selecting (308) a next network element (141) of the communication path for querying; and

if the next network element (141) has been selected, iterating the method from the querying step (302) for the next network element (141).

Support for the elements of claim 7 can be found at least from the following sections of Appellant's specification: page 5, line 18 – page 9, line 9 and page 10, line 18 – page 12, line 13.

Claim 13 positively recites (with reference numerals, where applicable, and cites to at least one portion of the specification added):

13. (original) A method for analyzing network characteristics comprising the steps of:

receiving (301) a notification signal from a network element (141), said notification signal indicative of a new communication path set-up by the network element (141) and including circuit identifier information;

querying (302) a network element (141) in a communication network (140) for connection information;

receiving (303) the connection information from the network element (141) in response to querying;

comparing (304) the connection information with the circuit identifier information to determine a match condition;

if the match condition occurs in the comparing step, querying (305) the network element (141) for routing information;

receiving routing information from the network element (141);

analyzing (306) the routing information received to map the new communication path established in the network;

selecting (308) a next network element (141) to query along the new communication path;

if the next network element (141) has been selected, fetching (308) from the received circuit identifier information associated with the next

network element(141) and iterating the method from the step of querying (302) for the next network element (141).

Support for the elements of claim 13 can be found at least from the following sections of Appellant's specification: page 6, line 9 – page 9, line 9 and page 10, line 18 – page 12, line 13.

Claim 17 positively recites (with reference numerals, where applicable, and cites to at least one portion of the specification added):

> 17. (previously presented) Apparatus for analyzing network characteristics in a network including a plurality of network elements (141) interconnected together to form a communication network (140), the apparatus comprising:
>
> means (250) for querying a network element (141) in the communication network (140) for local network information, the local network information comprising one or more items selected from the group including topology information, connection information, and performance information;
>
> means (240), responsive to receipt of the local network information, for analyzing the local network information received to map a communication path established in the network (140); and
>
> means (240), responsive to the local network information received and the communication path mapped in the analyzing means (240), for selecting a next network element (141) of the communication path for querying;
>
> wherein the means (250) for querying is responsive to a notification that the next network element has been selected.

Support for the elements of claim 17 can be found at least from the following sections of Appellant's specification: page 6, line 9 – page 9, line 9.

Grounds of Rejection to be Reviewed on Appeal

Claims 1-22 are rejected under 35 U.S.C. §102(e) as being anticipated by Bakshi et al. (U.S. 6574663 B1; hereinafter "Bakshi").

Arguments

<u>Rejection Under 35 U.S.C. §102</u>

Claims 1-22 are rejected under 35 U.S.C. §102(e) as being anticipated by Bakshi. The rejection is traversed.

In general, Bakshi discloses using topology of a network to operate and manage the network. More specifically, Bakshi teaches a discovery process where a topology server repeatedly discovers or identifies new network elements within a network. The topology server also ascertains various capabilities of each of the discovered/identified network elements. Based on the collected information, the topology server maintains two topology maps. One map is a general topology map of the entire network, including interconnections of all active and passive devices. Another map is an active topology map that includes all active devices of the network and the software and hardware resources or configurations of each active device (Bakshi, see e.g., col. 3, line 66 – col. 4. line 2; col. 4, lines 30 – 49; see also col. 5, lines 41 - 64).

Whether a device is active or passive is defined by its programmability during runtime. In particular, "[a]n active device can be configured and programmed to perform its existing service and to provide modified or new networking services while it is operating and connected to the network." A device, which existing functions cannot be changed during runtime, is a passive device (Bakshi, col. 2, line 58 – col. 3, line 13). Bakshi uses the general and active topology maps and information contained therein regarding the active/passive devices to provision various services (e.g., communication paths) within the network.

However, Bakshi does not teach or suggest at least:

> "analyzing the local network information received to map a communication path established in the network;
>
> responsive to the local network information received and the communication path mapped in the analyzing step, selecting a next network element of the communication path for querying,"

as recited in Appellant's independent claim 1. Specifically, within the context of the present invention, a communication path has been established within a communication network. The method of analyzing the network characteristics of claim 1 iteratively identifies those network elements that are associated with the <u>established communication</u>

path and extracts from those network elements local (to the respective network elements) network information such as topology information, connection information, and a performance information. Accordingly, Appellant's method of analyzing the network characteristics is not the same as the new device discovery process of Bakshi.

To facilitate understanding of the differences between the Appellant's invention and Bakshi's arrangement, Appellant includes *Diagram D1* and *Diagram D2*, where *Diagram D1* illustrates principles of the Bakshi arrangement, while *Diagram D2* illustrates principles of Appellant's claimed invention.

Both diagrams, *D1* and *D2* illustrate a communication network, which includes a plurality of network elements N1 through N12. Dashed lines between network elements, such as a line between network elements N1 and N2, illustrate communication links between such network elements. Thick unbroken lines, such as a line between N3 and N4 in *Diagram 2*, illustrate communication links that form an established communication path. Shaded rectangles, such as N1 in *Diagram 1*, illustrate active elements as defined in Bakshi.

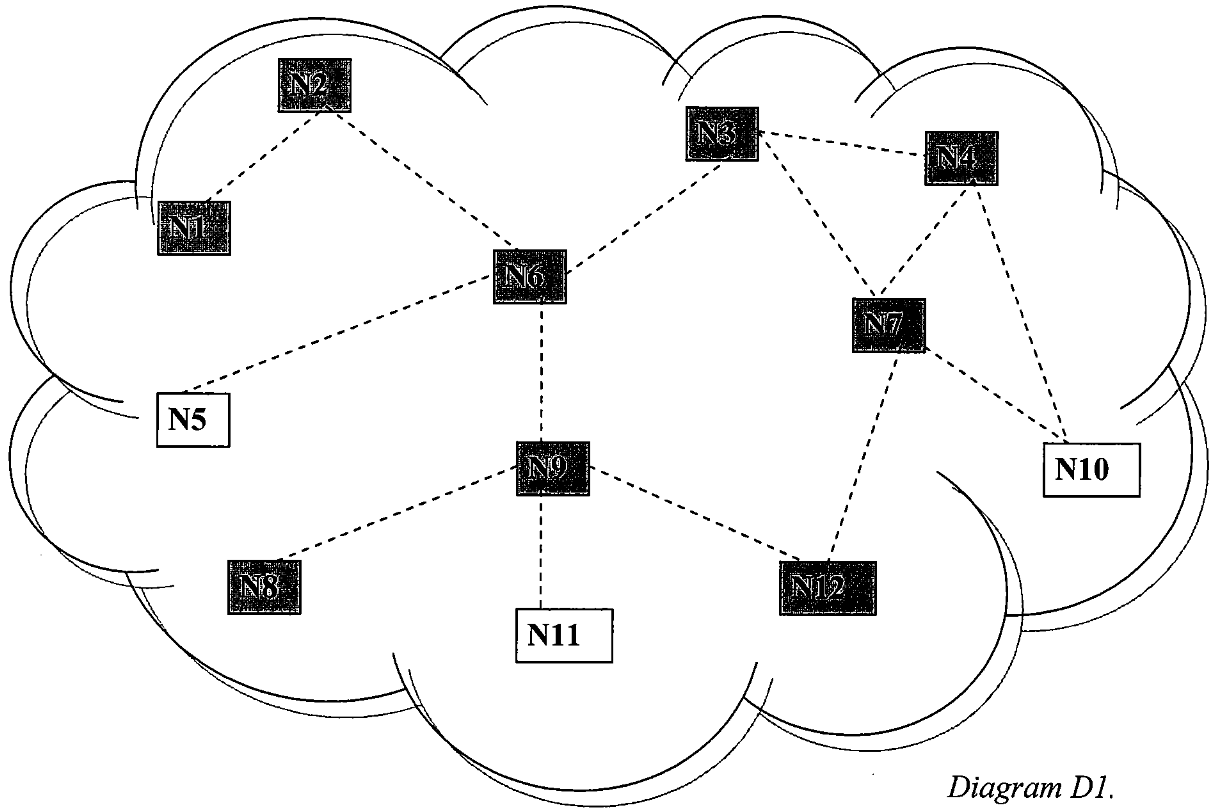

Diagram D1.

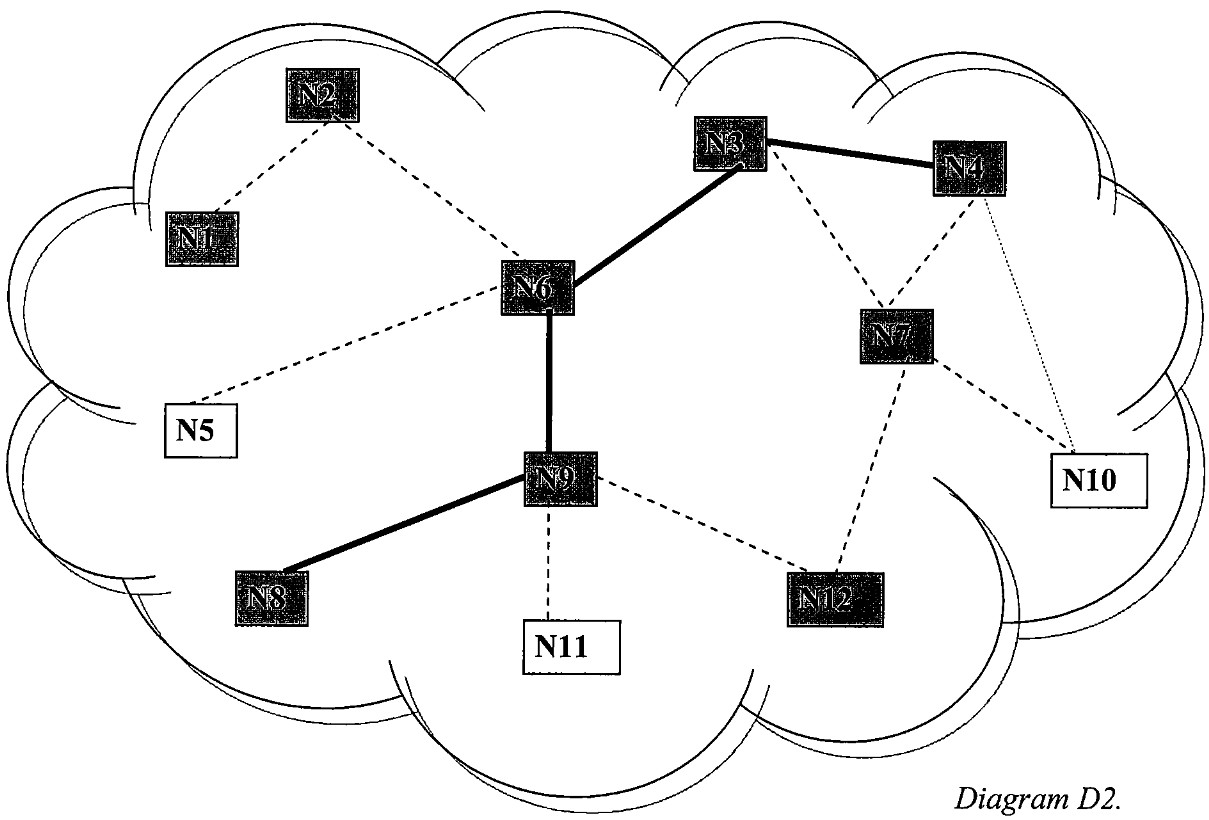

Diagram D2.

As discussed above, Bakshi teaches a discovery process where a server repeatedly discovers or identifies new network elements within a network and maintains two topology maps, a general topology map and an active topology map. Bakshi's general topology map of the communication network illustrated in *Diagram D1*, would include all the illustrated network elements N1 through N12 and all illustrated communication links between such elements, such as N1 <-> N2, N2 <-> N6, and so on. Bakshi's active topology map would include only active network elements: N1, N2, N3, N4, N6, N7, N8, N9, and N12, software and hardware resources (or configurations) of each of the active network elements, and communication links between the active elements: N1<->N2, N2<->N6, N6<->N9, N6<->N3, N9<->N8, N9<->N12, N12<->N7, N7<->N4, and N7<->N3.

Using the information contained in the active topology map, communication paths between the network elements may be established, for example, communication paths: N4 <-> N3 <-> N6<-> N9 <-> N8; N4 <-> N7 <-> N12 <-> N9 <-> N8, and so on may be established between network elements N4 and N8. However, Bakshi does not disclose discovering and/or maintaining information regarding such established communications paths, neither in the topology maps, nor somewhere else. Rather, Bakshi merely uses the discovery process and its results to find active network elements that are better suited to perform a requested service.

Unlike Bakshi, Appellant's invention provides for mapping communication paths already established in a network and analyzing the network based on those established communication paths. For example, in diagram D2, a communication path: N8 <-> N9 <-> N6 <-> N3 <-> N4 ("N8-N4") has been already established. Such established communication path is mapped via an iterative process of identifying those network elements that are associated with the communication path and extracting from those network elements local (to the respective network elements) network information, such as topology information, connection information, and a performance information. For example, to identify that network element N6 is associated with the established communication path N8-N4, network elements N9 or N3 are queried, depending on whether the querying process has been started with network element N8 or N4 respectively. Accordingly, unlike Bakshi, where a communication network is analyzed to

gather information helpful in establishing new communication paths, in Appellant's claimed invention the communication network is analyzed based on already established communication paths.

The Examiner asserts:

> "Bakshi shows 'analyzing the local network information received to map a communication path established in the network' in Figure 2 (col. 5, lines 15-65), more specifically col. 5, lines 47-51, shows that '<u>the above process repeats according to a temporal sequence (i.e. periodically) for the same active device and all active devices in order to keep the databases in the active topology server current.</u>' With this passage, it does show, that Bakshi reference does not limit itself to a 'startup' discovery process, but also applies to 'ongoing/current' discovery process, which means that the network (path, nodes) are already established" (see Advisory Action).

Applicants agree with the Examiner that Bakshi discloses ongoing discovery process. However, this discovery process does not involve mapping a communication path.

As defined by Bakshi, the topology of a network is "physical layout of the interconnections among linked electronic devices. ... Designated network devices such as switches and routers determine paths for forwarding data packets over the network according to the topological configuration. A given network topological configuration may change over time. Keeping track of such changes is often referred to as 'topology discovery'" (Bakshi, col. 1, lines 20 -30). In other words, the network topology includes mappings of the network elements and characteristics and connectivity of such network elements. However, information that two nodes (e.g., N6 and N9 in the example above) are currently linked, or even communicate, by itself is not sufficient to identify that their connection is a part of a particular communication path (e.g., N8-N4 path). For example, such a connection may be part of multiple communication paths (e.g., N2-N12, N2-N8, etc.).

Accordingly, while Bakshi discloses an ongoing discovery process, Bakshi does not teach or suggest that the discovery process includes mapping an established communication path. Moreover, the "providing services" phase of the Bakshi arrangement does not even mention using the established communication path information. This phase is primarily concerned with selecting an optimal device for a

requested service. The active topology map is searched for a device having a link to the target device and optimized for one or more link parameters, where a link parameter may define latency, throughput, hop count, path cost, and path reliability (Bakshi, col. 5, line 65 – col. 7, line 15; see also col. 1, lines 42- 44). However, this process does not involve established communication paths in any manner. Therefore, Bakshi is devoid of teaching mapping and/or using established communication paths.

Additionally, Bakshi does not teach or suggest at least:

> responsive to the local network information received and the communication path mapped in the analyzing step, selecting a next network element of the communication path for querying,"

as recited in Appellant's independent claim 1. The Examiner states that this element is disclosed in col. 5, lines 46-64 of Bakshi (see Final Office Action, page 4). Appellant disagrees. The cited portion states:

> "This completes the discovery phase for that particular active device. The above process repeats according to a temporal sequence (e.g., periodically) for the same active device and all other active devices in order to keep the databases in the active topology server 120 current.
>
> Alternatively, the active topology server 120 may initiate the discovery process itself, instead of waiting for incoming presence packets from active devices. The active topology server 120 can send Capability Enumerates packets to each and every active device in its list to get updated information. This process includes steps 250 through 270. However implemented, it is desirable to repeat the discovery process frequently enough so that the data on all active devices in the network 110 and the general topology map for all active and passive devices are as current as possible. Such repetitive discovery process also detects any linked device that has disappeared in the network 110."

As discussed above, Bakshi fails to teach discovery of the established communication paths. Furthermore, there is no indication in the above cited portion that order and/or relation between devices matter in how the discovery process is performed. To the contrary, Bakshi simply discovers "each and every" or "all" active devices in the network. This is entirely different from Appellant's arrangement of claim 1 which expressly recited selecting a next network element of the communication path for querying.

Anticipation requires disclosure in a single prior art reference of each and every element of the claimed invention arranged as in the claim. However, as discussed above,

Bakshi fails to disclose each and every element as arranged in Appellant's independent claim 1. Therefore, independent claim 1 is not anticipated by Bakshi and is allowable under 35 U.S.C. §102.

Claims 7, 13, and 17 include relevant limitations substantially similar to those discussed above with respect to claim 1. Therefore, for at least the reasons discussed above with respect to claim 1, independent claims 7, 13, and 17 are not anticipated by Bakshi, and therefore allowable under 35 U.S.C. §102.

Finally, because all the dependent claims recite additional limitations and all the limitations of the respective independent claims from which they ultimately depend, the dependent claims are also allowable.

Accordingly, Appellant's claims 1-22 are allowable over Bakshi under 35 U.S.C. §102. Appellant respectfully requests to withdraw the rejection.

Conclusion

Thus, Appellant submits that all of the claims presently in the application are allowable under the provisions of 35 U.S.C. §102.

For the reasons advanced above, Appellant respectfully urges that the rejection of claims 1-22 is improper. Reversal of the rejections of the Final Office Action is respectfully requested.

Respectfully submitted,

Dated: June 4, 2008 E M Wall

Eamon J. Wall
Registration No. 39,414
Patterson & Sheridan, L.L.P.
595 Shrewsbury Ave. Suite 100
Shrewsbury, NJ 07702
Telephone: (732) 530-9404
Facsimile: (732) 530-9808
Attorney for Appellant

CLAIMS APPENDIX

1. (previously presented) A method of analyzing network characteristics comprising the steps of:

querying a network element in a communication network for local network information;

receiving the local network information from the network element in response to querying, the local network information comprising one or more items selected from the group including topology information, connection information, and performance information;

analyzing the local network information received to map a communication path established in the network;

responsive to the local network information received and the communication path mapped in the analyzing step, selecting a next network element of the communication path for querying; and

if the next network element has been selected, iterating the method from the querying step for the next network element.

2. (original) The method as defined in claim 1 further comprising the step of receiving a notification signal from one or more network elements, the notification signal indicative of a network event, and wherein the step of querying is initiated in response to receiving said notification signal.

3. (original) The method as defined in claim 1 further comprising the step of determining network capacity using communication path data from the analyzing step.

4. (original) The method as defined in claim 1 further comprising the step of determining network performance using the communication path data from the analyzing step.

5. (original) The method as defined in claim 1 further comprising the step of detecting network faults using communication path data from the analyzing step.

6. (original) The method as defined in claim 1 wherein the topology information includes a routing table and wherein the connection information includes a connection table.

7. (previously presented) A computer having a memory for storing a software program that, when executed by a processor, causes the computer to perform a method comprising the steps of:

querying a network element in a communication network for local network information;

receiving the local network information from the network element in response to querying, the local network information comprising one or more items selected from the group including topology information, connection information, and performance information;

analyzing the local network information received to map a communication path established in the network;

responsive to the local network information received and the communication path mapped in the analyzing step, selecting a next network element of the communication path for querying; and

if the next network element has been selected, iterating the method from the querying step for the next network element.

8. (previously presented) The computer as defined in claim 7 further comprising the step of receiving a notification signal from one or more network elements, the notification signal indicative of a network event, and wherein the step of querying is initiated in response to receiving said notification signal.

9. (previously presented) The computer as defined in claim 7 further comprising the step of determining network capacity using communication path data from the analyzing step.

10. (previously presented) The computer as defined in claim 7 further comprising the step of determining network performance using communication path data from the analyzing step.

11. (previously presented) The computer as defined in claim 7 further comprising the step of detecting network faults using communication path data from the analyzing step.

12. (previously presented) The computer as defined in claim 7 wherein the topology information includes a routing table and wherein the connection information includes a connection table.

13. (original) A method for analyzing network characteristics comprising the steps of:

receiving a notification signal from a network element, said notification signal indicative of a new communication path set-up by the network element and including circuit identifier information;

querying a network element in a communication network for connection information;

receiving the connection information from the network element in response to querying;

comparing the connection information with the circuit identifier information to determine a match condition;

if the match condition occurs in the comparing step, querying the network element for routing information;

receiving routing information from the network element;

analyzing the routing information received to map the new communication path established in the network;

selecting a next network element to query along the new communication path;

if the next network element has been selected, fetching from the received circuit identifier information associated with the next network element and iterating the method from the step of querying for the next network element.

14. (original) The method as defined in claim 1 further including the step of storing the communication path established through the communication network.

15. (previously presented) The computer as defined in claim 7 further including the step of storing the communication path established through the communication network.

16. (original) The method as defined in claim 13 further including the step of storing the communication path established through the communication network.

17. (previously presented) Apparatus for analyzing network characteristics in a network including a plurality of network elements interconnected together to form a communication network, the apparatus comprising:

means for querying a network element in the communication network for local network information, the local network information comprising one or more items selected from the group including topology information, connection information, and performance information;

means, responsive to receipt of the local network information, for analyzing the local network information received to map a communication path established in the network; and

means, responsive to the local network information received and the communication path mapped in the analyzing means, for selecting a next network element of the communication path for querying;

wherein the means for querying is responsive to a notification that the next network element has been selected.

18. (original) The apparatus as defined in claim 17 wherein the querying means further comprises means for receiving a notification signal from one or more network elements, the notification signal indicative of a network event, and wherein the querying means is responsive to receiving said notification signal.

19. (original) The apparatus as defined in claim 17 further comprising means for determining network capacity using the communication path from the analyzing means.

20. (original) The apparatus as defined in claim 17 further comprising means for determining network performance using the communication path from the analyzing means.

21. (original) The apparatus as defined in claim 17 further comprising means for detecting network faults using the communication path from the analyzing means.

22. (original) The apparatus as defined in claim 17 wherein the topology information includes a routing table and wherein the connection information includes a connection table.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None